5,036,165 and Seimens, UK Specification 468,827 (referred to in the Office Action as German patent specification).

Applicants hereby respectfully request reconsideration of the application in light of the arguments to appear hereinafter.

Claims 1, 2, 5-8, 11 and 13 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Applicants' disclosed Fig. 2 in view of Takaoka et al. Applicants respectfully traverse the rejection for at least the following reasons:

1. No proper basis exists that supports the combination of the references; and

2. Even if the references are properly combined, which it is not admitted, not every limitation would be met.

The applicants' Fig. 2 does not disclose the invention. The claimed invention is directed to a plant including a specified type of high voltage rotating machine which employs a flexible cable that confines the electric field. The cable has a plurality of insulating strands and at least one insulating strand that contacts the cover. The plant employs a machine, i.e., a generator that produces high voltage. The invention is not disclosed in Fig. 2. The specification says at page 5, lines 22-27 that it is not possible to produce high voltage DC with conventional machines. It is only with the machines of the invention that the high voltage DC can be achieved for direct connection to the network.

The Office has rejected the above claims as being obvious over Fig. 2, in view of Takaoka et al. and Elton et al. ('565) or Fig. 2 in view of Elton et al. ('565) and further in view of the specification '827. Applicants assert this is an improper combination of

references in light of the standard regarding such a combination set forth in re Greiger, 815 F2.d at 688, 2 USPQ 2d at 1278 (Fed. Cir. 1987). This standard is that "[o] bviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, *absent some teaching, suggestion or incentive* supporting the combination." Id. (emphasis added). As will be shown, the art fails to teach the combination asserted by the Office.

According to the Office Action, Fig. 2 discloses the claimed invention except for a teaching of having the electrical cable comprise a plurality of insulated stranded conductors and at least one insulated stranded conductor. Takaoka et al. Figs. 7, 8, 10 and 11 teach having a stranded conductor for an electrical cable including a combination of uninsulated and insulated stranded conductors. Thus, according to the Office Action it would have been obvious to one of ordinary skill in the art to have provided the windings of Fig. 2 comprising insulated and uninsulated stranded conductors "since such a modification according to Takaoka et al. would reduce the amount of insulation needed and the number of electrical connections required in the end windings".

As a way to explain why the present invention is different from the asserted prior art, and is not obvious over said art, it is believed that a brief review of the invention is in order. Conductors used in high voltage electric machines are exposed to high magnetic flux in order to induce voltage in the winding and thereby drive a current. Traditionally, these windings have been made of rectangular conductors in order to minimize any current losses. Typically, the linear dimension of the conductor and the direction of the magnetic field are arranged in order to reduce the eddy current paths.

While circular conductors exist, a problem with circular conductors is that when increasing the conductor area to support a large current flow, the larger current often entails an uneven distribution in the conductor. The electric current tends to flow to the outer surface of the conductor to create what is known as "skin effect". The term is recognized in the IEEE Standard Dictionary of Electrical and Electronics terms.

The present invention has identified a structure to help reduce eddy current losses in the rotating machine environment. The problems caused by eddy currents are unrelated to the skin effect problem discussed above. In order to reduce eddy current induced losses, the conductor strands of the present invention are insulated from one another in order to prevent path for the flow of the eddy currents between the conductors. The degree of insulation between the conductors is small. Thus, the assertion and conclusion drawn by the Office that the insulated conductor strands would reduce the amount of insulation needed is not a correct conclusion. In other words, the insulation provided around the individual strands in the conductive core of the cable does not provide insulation sufficient to confine the electric field. It simply provides a mechanism for reducing eddy current losses in the conductor. Indeed, the invention would work without the insulation between the strands but at a reduced deficiency.

At least one of the outer strands is uninsulated and is placed in contact with the inner semiconducting layer of the cable. When arranged in this way, the potential of the inner semiconducting layer is the same as that on the uninsulated conductor thereby creating the uniform electric field in the insulation layer. Thus, in a sense the

uninsulated strand functions to reduce the amount of insulation necessary to confine the electric field.

Claims 15-19, 21-28, 32-43 and 44-55 are rejected as above and further in view of Elton et al. '165. According to the Examiner, Fig. 2 and Takaoka et al. disclose the claimed invention except for utilizing a cable in the electrical machine having conductors with semiconducting properties. The Office asserts that Elton et al. teaches that it is known to have an electrical cable comprising an internal grading layer of semiconducting pirolyzed glass fiber in electrical contact with the cable conductor. In another form, Elton et al. teach an electrical cable provided with an exterior layer of semiconducting pirolyzed glass fiber in contact with the cable insulator at a predetermined reference potential. The Office therefore concludes that it would have been obvious to use the cable assembly of Elton et al. in the device of Fig. 2 as modified by Takaoka et al. in order to "provide a conductor which prohibits the development of corona discharge."

Important to the legal position of the Office in rejecting the present claims is its interpretation of Elton U.S. Patent No. 5,036,165 ('165). Applicants read the Office Action to mean that the Examiner is construing Elton '165 as disclosing a particular type of electrical cable used as a winding in a dynamo electrical machine. For the reasons stated herein, Elton '165 does not disclose that the electrical cable shown in Fig. 1 thereof may be used for windings in a dynamo electrical machine. Rather, the conductor shown in that figure is used only for an electrical transmission and distribution cable.

Elton '165 is a division of what is now issued as U.S. Patent No. 4,854,565 (Elton '565). This patent is incorporated by reference in its entirety into Elton '165 as is stated in Col. 1, lines 5-9 of Elton '165. Therefore, Elton '165 must be construed as if all of the text and drawings of Elton '565 or expressedly included and reproduced in Elton '165.

Elton '565 discloses a semiconducting layer for insulated electrical conductors in three different embodiments. The first embodiment (Figs. 1-6) deals with windings of a dynamo electric machine. In this embodiment, the conductors are referred to exclusively as "windings" or "bars". The second embodiment (Fig. 7) relates strictly to an electrical cable use for transmission of high voltage. With this embodiment, the conductors are referred to as a "cable" and not as a "bar" or "winding." The third embodiment (Fig. 8) relates to the use of a semiconductor layer disposed on an electrical housing surrounding digital electrical equipment. The conductor in this particular embodiment is referred to as a "housing" as opposed to a "cable", or a "bar" or a "winding." In reviewing both Elton et al. references the terms use in each reference were carefully chosen and applied uniformly throughout each reference. The above being said, it must further be pointed out that the mention of a "dynamo electric machine" in Elton '165 is likely inadvertent. It appears that if the term should have been deleted when the divisional application was filed on the cable embodiment. However, whether the inclusion of dynamo electric machine was inadvertent or not, it is immaterial since all of the Elton '565 disclosure has been incorporated by reference, and therefore must be considered. When the entire contents of Elton '565 are considered, it is clear that the conductor designated 100 in Elton '165 relates only to an electrical cable for the transmission and distribution of electrical power, not as a winding

for a dynamo electric machine. Any other interpretation would be contrary to the plain meaning given to the words as defined in the Elton specifications.

It is a substantial omission that there is no mention of cable 100 being useful as a winding, especially when there is a dynamo electric machine described elsewhere in the Elton '565 patent. Had the patentees believed that an embodiment comprising cable 100 as a winding would work, it is respectfully contented that they would have at least disclosed such a use. Applicants contend that it could be reasonably inferred that the patentees in Elton '565 and Elton '165 did not do so because they believed, as would others in the art, that it would not work. The meticulous use and choice of words support this position. The Office does not set forth any reasons to the contrary, other than the alleged advantage of reduced corona discharge. As discussed below, this advantage does not apply to the combination suggested by the Office. Furthermore, the Elton '565 reference does not solve the electric field problems in the end winding region of the rotating electric machine's winding.

Moreover, the Applicants further submit that there is no incentive to combine the two references because the advantage of a reduced corona discharge can only be obtained by following the teachings of Elton et al., which for a dynamo electric machine means the use of a "bar" with one layer of a semiconductive material not an electrical transmission and distribution cable. Therefore, there is no incentive to combine, as contended by the Office, when the advantage does not actually materialize.

Furthermore, Applicants note that MPEP §706.02(j) states that one criterion that must be met to establish obviousness is that there must be a reasonable expectation of

success. This criterion cannot be met when the aforementioned references are combined.

There is no likelihood of success in fashioning a winding with the cable of Elton et al. '165 because of the brittleness of the cable. In particular, the cable includes a pirolyzed glass fiber layer which must be cured and would render the cable inflexible and unable to be trhreaded through the stator slots. If cured after winding, then the winding and stator would both need to be cured adding great cost and additional time to the manufacturing cycle. Also, a pyrolyzed glass fiber would be stiff during operation of the machine and subject to cracking due to vibration, resulting in corona discharge negating the apparent advantage of prohibiting corona discharge, and resulting in a combination that fails to work at all. Again, such a winding also fails to solve the electric field issues in the end winding region of the winding.

For at least the foregoing reasons Applicants submits that the link in the Office's chain of reasoning, i.e., the use of the cable of Elton '165 in an arrangement of Fig. 2 as modified by Takaoka is improper. Applicants further submit that the series of logical steps required to make the combination are simply not taught or suggested by the references, and that it would not have been obvious to one of skill in the art to make the stated of modification in light of the teachings of Fig. 2, Takaoka and Elton et al. '165.

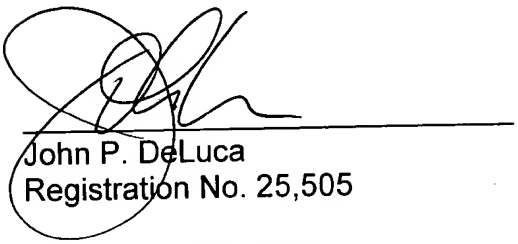
Accordingly, Applicants respectfully submit that the claims define novel and unobvious subject matter. Applicants further respectfully request that the rejection be reconsidered and withdrawn.

The dependent claims include all the limitations of the base claim and therefore for at least the same reasons set forth above, the rejection thereof is improper.

The rejection of claims 29-31 under 35 U.S.C. §103(a), claims 29-31 are rejected under 35 U.S.C. §103(a) as unpatentable over Fig. 2, in view of Elton '165 and further in view of Seimens (the UK specification). The Office contends that the disclosed Fig. 2 and Elton et al. disclose the claimed invention except they do not disclose having a stator comprising slots consisting of a number of cylindrical openings separated by narrow waist parts. The Siemens reference teaches that it is well known to have a stator having cylindrical openings in the slots with decreasing radius in order to accommodate the winding conductors having various diameters. Thus, the Office contends that it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the stator slot arrangement as taught by Siemens and to have modified the slots to accommodate winding conductors having varying diameters. Siemens simply shows circular conductors and does not employ a flexible cable which is threaded through the machine. The combination again fails to solve the electric field problems in the end winding region of the winding because the Elton reference provides no solution to this problem. Thus, it is believed that the combination asserted by the Examiner does not meet the rejected claims and withdrawal of the rejection is respectfully requested.

In view of the foregoing, it is respectfully requested that the Examiner reconsider his rejections of the claims, the allowance of which is earnestly solicited.

Respectfully submitted,



John P. DeLuca
Registration No. 25,505

Attorney for Applicant

DYKEMA GOSSETT PLLC
THIRD FLOOR WEST
1300 I Street, N. W.
Washington, D.C. 20005
(202) 522-8626

MARKED CLAIMS

Amend claims 1, 21 and 39 as follows:

1. (Three Times Amended) A plant for generating high voltage power comprising a rotating high-voltage machine including at least one winding and a converter wherein at least one of a mechanical torque is convertable via the converter into direct current and direct voltage, and wherein direct current and direct voltage are convertable via the converter into a mechanical torque said winding <u>including a flexible cable</u> including a current carrying conductor and a field confining insulating cover, said current carrying conductor including a plurality of insulated strands and at least one uninsulated strand in contact with the cover.

21. (Three Times Amended) <u>A</u> [The] plant for generating high voltage power including a machine having a magnetic circuit including at least one winding wherein the magnetic circuit comprises a magnetic core at least one and winding wherein the at least one winding comprises a cable including at least one carrying conductor a field confining insulating cover surrounding the at least one conductor including an inner semiconducting layer, an insulating layer of solid insulation surrounding the inner layer, and an outer semiconducting layer surrounding the solid insulation.

39. (Twice Amended) A plant for generating high voltage power including a rotating high voltage electric machine and a converter, the machine comprising a stator; a rotor

and a winding, wherein said winding comprises a flexible cable including at least one current-carrying conductor and a magnetically permeable, electric field confining insulating cover surrounding the conductor, said cable forming at least one uninterrupted turn in the corresponding winding of said machine said current carrying conductor including a plurality of insulated strands and at least one uninsulated strand in contact with the cover.